

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit	: 1793	Customer No. 035811
Examiner	: Caitlin Anne Fogarty	
Serial No.	: 10/583,220	Docket No.: JFE-06-1129
Filed	: June 16, 2006	
Inventors	: Atsushi Miyazaki	
	: Yasushi Kato	
	: Osamu Furukimi	
Title	: FERRITIC Cr-CONTAINED	Confirmation No.: 7655
	: STEEL	
		Dated: December 21, 2009

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**RESPONSE**

**Mail Stop Amendment**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is submitted in response to the Official Action dated July 22, 2009.

Claims 13-17, 20 and 21 stand provisionally rejected under non-statutory obviousness-type double patenting over Claims 1-8, 10-14 and 16 of co-pending Application No. 10/512,782. The Applicants continue to respectfully request that further treatment of this rejection be held in abeyance pending an indication of allowability.

Claims 13-17, 20 and 21 stand rejected under 35 USC §103 over Kawabata. The Applicants acknowledge the Examiner's detailed comments addressing the Applicants' previous comments. The Applicants respectfully submit, however, that there are several errors in the rejection and respectfully submit that Kawabata is inapplicable. Reasons are set forth below.

This rejection is fundamentally premised on the notion of inherency. The rejection at the bottom of page 6 supports this position by stating that:

the Examiner maintains the position that since the composition of the ferritic-Cr-contained steel of Kawabata overlaps with the composition of the steel of the instant invention and since the steel of Kawabata is made using a method similar to the method of the instant invention, one of ordinary skill in the art would expect the steel of Kawabata to inherently have similar physical and mechanical properties.

The Applicants respectfully submit that this position does not support an inherency rejection under MPEP §2112. To briefly summarize the requirements set forth in MPEP §2112, the Applicants note that the physical and mechanical properties mentioned in the rejection “must” be “necessarily” present in the prior art. It is the burden of the PTO to establish that such properties are “necessarily” present. The Applicants respectfully submit that a mere statement of overlaps in composition and “similar” methods do not meet this extremely high burden. Although the Applicants acknowledge, *arguendo*, that the composition of the steel could be an indicator, the Applicants do not agree that so called “similar” methods ensure that the physical characteristics are “necessarily” present. At best, utilization of “similar” methods would establish that the properties could be present or might be present or even might likely be present. However, reliance on “similar” methods does not establish that the properties “must necessarily” be present as required by the MPEP. On this basis alone, the Applicants respectfully request that the rejection be withdrawn.

Despite this deficiency, the rejection places the burden on the Applicants to provide factual evidence supporting that the product would be different. The problem is that the Applicants have already done that. In particular, the Applicants pointed to specific facts in the Kawabata disclosure which factually demonstrate differences in methodology between producing steels of Kawabata and producing the Applicants’ steels. The rejection dismisses those facts as being directed to mere “specific embodiments.” The Applicants respectfully

submit that dismissing actual facts taken from the prior art upon which the rejection is based is improper. This is particularly true given that the rejection is based on speculation determined by allegedly “similar” methodology.

The Applicants have affirmatively rebutted such speculation by pointing to specific facts associated with specific embodiments disclosed and described in Kawabata that would lead one skilled in the art to have an expectation that the Applicants’ steels could very well be different from those of Kawabata. In that regard, it must always be kept in mind that the standard for establishing inherency is that the properties “must” be “necessarily” present. The fact that the Applicants have pointed to specific facts in the Kawabata disclosure that at least in a limited way directed to those specific embodiments establishes that the properties are likely to be different inherently means that Kawabata cannot meet the “must” be “necessarily” present properties requirement of MPEP §2112. Thus, the Applicants again respectfully submit that the rejection is improper and must be withdrawn.

The Applicants also invite the Examiner’s attention to the Applicants’ Table 1, wherein Steel Nos. 5 and C, for example, have the exact same amount of W but, because there were differences in finishing annealing temperature (not to mention the fact that finishing annealing was performed in both cases which is different from Kawabata), the precipitated W amount was dramatically different. This can be seen as 0.095% in Steel 5 versus the Comparative steel which was annealed outside of the finishing temperature and had a precipitated W amount of 0.580%--- which is well outside the Applicants’ claimed range.

Therefore, the Applicants respectfully submit that they have now pointed to additional facts demonstrating that not only does an additional annealing step potentially have a big difference on the makeup of the steel, but so does the temperature at which the second annealing

step is performed. Table 1 provides examples of “similar” methods. However, they also factually demonstrate serious differences in the resulting steels and their physical and mechanical properties.

The rejection further states that the Applicants have not submitted factual evidence to support the argument that an annealing time of three minutes would produce a significantly different product than an annealing time of ten seconds. The Applicants respectfully submit that they are not obligated to do so given the fact that they have already demonstrated in multiple instances that the Kawabata steels are very likely to have physical and mechanical properties different from those of the Applicants. The Applicants nonetheless submit copies of two randomly selected publications that show that annealing times based in minutes and even seconds can have significant impact on physical and mechanical properties of various types of materials. For example, page 1170 of Perrard shows various lengths of time of annealing measured in 0, 90 seconds and 180 seconds and the impact on partially recrystallized ferrite. These are significant differences that would readily be recognized by those skilled in the art. Then, Solórzano shows heat treatment conditions measured in hours on the one hand and in 5, 10, 30 and 120 second increments on the other hand. Fig. 2 is particularly instructive in showing the differences in microstructure for an annealing for 10 seconds versus 120 seconds. Thus, the Applicants have still further provided additional factual evidence that annealing times measured in minutes versus seconds can have significant impact on the microstructure of steels and, as a consequence, their mechanical and physical properties.

Beyond those easily found simple explanations, the Applicants verify below in detail the differences between the annealing conditions ((second) annealing after cold rolling) of Kawabata and those ((second) annealing) of the Applicants.

The diffusion length  $X$  (m) of the element is expressed from the diffusion coefficient  $D(m^2)$  and annealing time  $t(s)$  as  $x = \sqrt{2Dt}$ .

The diffusion coefficient  $D$  is expressed from  $D = D_0 \cdot \exp(-Q/RT)$ , wherein  $D_0$  is a fixed number,  $Q(J/mol \cdot K)$  is activation energy and  $T(K)$  is the absolute temperature.

A resultant diffusion length obtained by using a formula of diffusion coefficient of  $W$  in  $\alpha$  Fe which is shown in the Review of Oikawa (The technology reports of the Tohoku Univ., vol. 47 (1982), p 215.) is provided next.

Under the cold rolled sheet annealing condition of the Examples of Kawabata, the diffusion length is less than  $2 \mu m$  ( $1.92 \times 10^{-6}m$ ) even under the condition of the highest temperature of  $1,150^\circ C$ . In sharp contrast, it is understood that in a preferable temperature range in Claim 13, the diffusion length is  $3 \mu m$  or more ( $3.70 \times 10^{-6}m$ ) even under the lowest temperature condition ( $1,050^\circ C$ ) whereas close to  $12 \mu m$  under the highest temperature condition ( $1,200^\circ C$ ). The diffusion lengths of element are by far larger in annealing after the Applicants' cold rolling.

Diffusion length in  $\alpha$  Fe in W atomic element

$D_0$   $2.00 \times 10^{-4}$   $m^2/sec$

$Q$   $2.46 \times 10^{-5}$   $J/mol$

ref. H. Oikawa: The technology reports of the Tohoku Univ., vol. 47 (1982), p. 215

Cold rolled sheet annealing condition of the Inventive examples of Kawabata

Temperature $^\circ C$	Time (sec)	$D(m^2/s)$	$X = \sqrt{2Dt}$ (m)	
1,150	10	$1.83 \times 10^{-13}$	$1.92 \times 10^{-6}$	Maximum Temp. of Examples
900	10	$2.17 \times 10^{-15}$	$2.08 \times 10^{-7}$	Minimum Temp. of Examples

Cold rolled sheet annealing condition of the present application

Temperature °C	Time (sec)	$D(m^2/s)$	$X=\sqrt{2Dt}$ (m)	
1,200	180	$3.72 \times 10^{-13}$	$1.16 \times 10^{-06}$	Maximum Temp. of preferable range
1,050	180	$3.80 \times 10^{-14}$	$3.70 \times 10^{-08}$	Minimum Temp. of preferable range

Further, as set forth in paragraphs Nos. [0037 to [0038], in the Applicants' Specification, according to Claim 13, precipitated W is set to be 0.1% or less and for securing this, it is important to determine appropriately the hot-rolled sheet annealing temperature and the finish annealing temperature, particularly the finish annealing temperature.

Paragraphs Nos. [0004] to [0005] in the Applicants' Specification recite that the precipitated state of W is a precipitated state mainly in a form of the Laves phase and it occurs most rapidly at a precipitation temperature centering around 700°C. (Literature 1: by Sawatani, et al., Iron & Steel, vol. 65 (1979), No. 8, Fig. 5, and Literature 2: by Miyazaki, et al., Iron & Steel, vol. 84 (1998), No. 9, Fig. 4). To suppress the generation of precipitation in hot rolled sheet annealing, annealing at a temperature of 950°C or more is indispensable and even when annealing is conducted at 950°C or more, a steel sheet passes precipitation temperature in the cooling process. Moreover, because a sufficient cooling rate is unable to be obtained due to the large plate thickness, the precipitated state of W is inevitably generated. In the Inventive examples of Kawabata as set forth in column 10 at lines 41 to 52, there are conducted three types of hot-rolled sheet annealing—that is to say, annealing at 1,150°C for one minute, 1,000°C for one minute and 850°C for 5 hours. However, when annealing is performed at 850°C for 5 hours, Laves phase is conspicuously precipitated and as a result of this, re-melting is not achieved by subsequent cold rolled sheet annealing.


On the other hand, according to Claim 13, the precipitated state of W, which is caused by hot rolled sheet annealing, is re-melted by the cold rolled sheet annealing condition. For that purpose, from the standpoint of the diffusion length as mentioned above, a condition which is different from that of ordinary methods is necessary. In the cooling step of cold rolled sheet annealing, the sheet passes through a precipitation temperature range as in the case of hot rolled sheet annealing. Nevertheless, because the thickness of the cold rolled sheet is small, the time of passing through said temperature range is limited to a short period. Hence, precipitation of W does not occur.

As has been discussed above with respect to Claim 13, the amount of the generation of precipitated W is suppressed to a low level by determining the length of time of cold rolled sheet annealing whereby the precipitated state of W, which is precipitated by hot rolled sheet annealing, is solid soluted again and the amount of solid soluted W is increased. Setting the amount of the precipitated W to 0.1% or less is not disclosed, taught or suggested in Kawabata. The difference in the cold rolled sheet annealing condition of Kawabata is large and leads those skilled in the art away from the Applicants' approach which produces very different products.

The Applicants accordingly respectfully submit that the physical and mechanical properties of steels of Kawabata are not inherently present under the standard required by MPEP §2112. Withdrawal of the rejection is respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



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